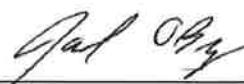


CALCULATION PACKAGE COVER SHEET

Client: Gowanus Canal Remedial Design Group (RD Group) **Project:** Gowanus Canal Superfund Site **Project #:** HPH106A

TITLE OF PACKAGE: GEOLOGIC THICKNESS INTERFACE CALCULATION

PREPARATION	CALCULATION PREPARED BY: (Calculation Preparer, CP)	Signature  Name Jacquelyn O'Bryan, P.E.	20 March 2017
REVIEW	ASSUMPTIONS & PROCEDURES CHECKED BY: (Assumptions & Procedures Checker, APC)	Signature  Name Raphael Siebenmann, P.E.	21 March 2017
BACK-CHECK	COMPUTATIONS CHECKED BY: (Computation Checker, CC)	Signature  Name Raphael Siebenmann, P.E.	21 March 2017
APPROVAL	BACK-CHECKED BY: (Calculation Preparer, CP)	Signature  Name Jacquelyn O'Bryan, P.E.	19 May 2017
	APPROVED BY: (Calculation Approver, CA)	Signature  Name J.F. Beech, Ph.D., P.E.	19 May 2017

REVISION HISTORY:

NO.	DESCRIPTION	DATE	CP	APC	CC	CA
0	TB4 Pilot Study Design – Issued for Bid	05/19/17	JO	RS	RS	JFB

CP: JO Date: 3/20/2017 APC: RS Date: 3/21/2017 CC: RS Date: 3/21/2017
Client: RD Group Project: Gowanus Canal Superfund Site Project No: PHH106A

GEOLOGIC THICKNESS INTERFACE CALCULATION

INTRODUCTION AND PURPOSE

The interface between the various layers in the geologic model is of key importance in the remedial design at the Gowanus Canal Superfund Site. The remediation approach from the September 2013 Record of Decision (EPA 2013) involves dredging the entire column of impacted soft sediment that has accumulated in the Gowanus Canal (Canal). Dredging of the underlying native alluvial and glacial deposit sediment is only anticipated in order to maintain navigation depths. Understanding the location of the various geologic interfaces is important to the design of the remedial action.

The approach used to establish the interfaces between the soft sediment, native alluvial sediments and glacial deposits, as well as the associated quality control procedures, are described in the following paragraphs. Once the 3D extent of the various layers was finalized, layer thicknesses and layer volumes were calculated. These results are presented below.

METHOD

The available geologic information used to establish the various interfaces included Cone Penetrometer Testing (CPT) logs and sediment cores from the PD-8 investigation, sediment cores from PD-7/18 investigation, GZA locations from the National Grid Fulton Remedial Design report (2016) and historic sediment logs in RTA3 from GEI (2009), EPA (2011), and CH2M (2015). With the highly dynamic nature of bathymetry in the Canal, the most recent data was used to most closely represent current conditions. For each of these data sources the northing, easting and elevation of each interface was established. This data is listed in Table 1 and presented on Figures 1 through 10.

CTech's Earth Volumetric Studio (EVS) was used to interpolate the geologic information listed in Table 1 into estimated geologic interfaces. Specifically, the data was interpolated using the Natural Neighbor approach in EVS. Natural neighbor approach finds the closest subset of input samples to a query point and applies weights to them based on proportionate areas to interpolate a value. Its basic properties are that it is local, using a subset of samples that surround a query point, and interpolated heights are within the range of the samples used.

The top of the soft sediment is subject to erosion and deposition forces and, as a result, is constantly shifting, albeit by very small amounts, in some areas. Since the bathymetric surface and the data in Table 1 were established at different times, some additional measures were required to capture

CP: JO Date: 3/20/2017 APC: RS Date: 3/21/2017 CC: RS Date: 3/21/2017
Client: RD Group Project: Gowanus Canal Superfund Site Project No: HPH106A

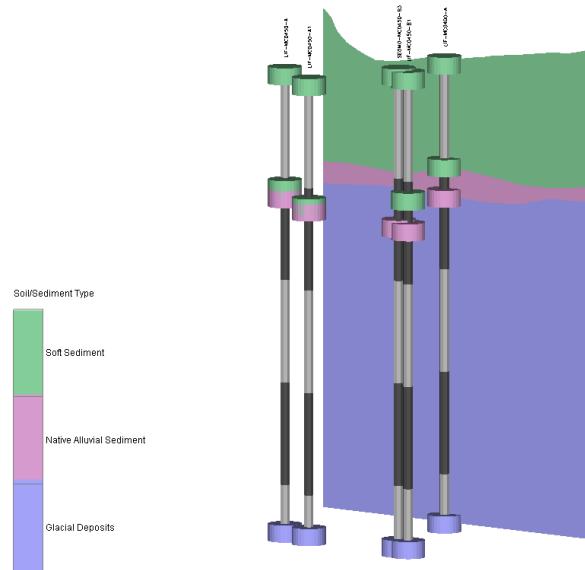
a single-state, constant surface in the model. To address this challenge, the top of the soft sediment layer in the EVS model was set arbitrarily high and then the bathymetry was used to shave it down to the bathymetric surface state in 2014. Over 200 cross-sections of the resulting model were then used to check the sediment log interpretation on a location-by-location basis. This process resulted in further QC of the logs and refinement of the estimated geologic interfaces. This analysis resulted in approximately 25 CPT locations being cross-checked with a core location to better clarify the CPT logs and adjust the contact depths as appropriate. The majority of these CPT points were in areas where a geologic unit was absent or very thin. The final interface surfaces were exported as raster grids which could be further utilized in both GIS and AutoCAD Civil 3D (Civil 3D), as well as future EVS modeling tasks. The geologic input is provided in Table 1 and shown in Figures 1 through 10.

As a second check, volumes were calculated using GIS, Civil 3D, and EVS. In GIS, the extract by mask tool was used to extract only the canal cells and then the raster calculator was used to calculate thickness and volume. In Civil 3D, the geologic surface interface rasters were used to create a Triangular Irregular Network (TIN) surface, which was then used to calculate the volumes. In EVS, the volumes were calculated using the area cut and volumetric modules. The comparative analysis, previously completed as part of the 35% RTA1 Design, showed that the different methods resulted in similar total volumes of soft and native alluvial sediments (< 1%). Thus EVS, GIS, and Civil3D were all considered appropriate tools for the design (e.g., dredge and capping plans, dredge volume estimates). The extent of where total Canal volumes were estimated is provided in Figures 1 through 10.

CP: **JO** Date: **3/20/2017** APC: **RS** Date: **3/21/2017** CC: **RS** Date: **3/21/2017**

Client: **RD Group** Project: **Gowanus Canal Superfund Site** Project No: **HPH106A**

Example of Section-by-Section Review



CP: JO Date: 3/20/2017 APC: RS Date: 3/21/2017 CC: RS Date: 3/21/2017
Client: RD Group Project: Gowanus Canal Superfund Site Project No: HPH106A

CONCLUSIONS

The slice-by-slice review of the estimated surfaces with the sediment logs resulted in sediment layers that are ready to be used for the next stages of the remedial design. Due to minor differences in the software algorithms between the software packages, there are slight differences in the calculated values but these differences are minor. Thus all three tools were found to be appropriate to generate surfaces for the design (e.g., dredge and capping plans, dredge volume estimates).

REFERENCES

- CH2M, 2015, “In Situ Solidification/Stabilization Pilot Test Construction Completion Report Gowanus Canal Superfund Site, Brooklyn, New York”.
- EPA, 2011, “Remedial Investigation Report”.
- GEI, 2009, “Remedial Investigation Technical Report”.
- GZA GeoEnvironmental, Inc., 2016. “Remedial Design Work Plan (RDWP) – Near Term Remedial Actions, Fulton Municipal Works, Former Manufactured Gas Plant, Brooklyn, New York”.

Page **5** of **23**

CP: **JO** Date: **3/20/2017** APC: **RS** Date: **3/21/2017** CC: **RS** Date: **3/21/2017**

Client: **RD Group** Project: **Gowanus Canal Superfund Site** Project No: **HPH106A**

TABLE

CP: JO Date: 3/20/2017 APC: RS Date: 3/21/2017 CC: RS Date: 3/21/2017
 Client: RD Group Project: Gowanus Canal Superfund Site Project No: HPH106A

Table 1. EVS Geologic Input

Sounding ID	X (ft NAD83)	Y (ft NAD83)	Elev Bottom Soft Sediment (ft- NAVD88)	Elev Bottom Native Sediment (ft-NAVD88)	Data Source
LIF-4TB0000-A	633405.09	671449.45	-17.85	NA	PD-8
LIF-4TB0000-A1	633403.89	671451.86	-17.63	-22.13	PD-8
LIF-4TB0050-A	633391.68	671381.86	-15.14	-21.24	PD-8
LIF-4TB0050-B	633430.67	671406.98	-14.11	-21.91	PD-8
LIF-4TB0100-A	633425.59	671363.62	-18.59	-25.89	PD-8
LIF-4TB0150-A	633424.24	671301.26	-15.93	-24.03	PD-8
LIF-4TB0150-B	633457.79	671304.23	-16.78	-28.28	PD-8
LIF-4TB0200-A	633457.93	671250.95	-14.83	-22.13	PD-8
LIF-4TB0250-A	633441.94	671243.40	-13.51	-20.51	PD-8
LIF-4TB0250-B	633490.88	671209.87	-15.59	-23.59	PD-8
LIF-4TB0275-A	633477.85	671170.09	-13.90	-21.40	PD-8
LIF-4TB0300-A	633500.76	671183.30	-14.11	-24.61	PD-8
LIF-4TB0350-A	633540.90	671125.89	-14.62	-23.82	PD-8
LIF-4TB0350-B	633555.83	671169.04	-14.31	-26.11	PD-8
LIF-4TB0400-A	633600.65	671102.65	-16.11	-30.51	PD-8
LIF-4TB0450-A	633591.81	671090.18	-14.83	-27.83	PD-8
LIF-4TB0450-B	633641.77	671123.26	-12.61	-27.31	PD-8
LIF-4TB0500-A	633670.13	671055.05	-14.99	-27.05	PD-8
LIF-4TB0550-A	633688.97	671014.10	-13.28	-22.78	PD-8
LIF-4TB0550-B	633723.14	671055.66	-16.49	-24.99	PD-8
LIF-4TB0600-A	633752.28	671012.36	-15.38	-19.48	PD-8
LIF-4TB0650-A	633765.78	670976.08	-15.74	-17.84	PD-8
LIF-4TB0650-B	633795.14	671007.92	-15.79	-18.09	PD-8
LIF-4TB0700-A	633825.72	670953.15	-13.90	-17.42	PD-8
LIF-7TB0075-A1	632074.85	671208.06	-18.03	-22.93	PD-8
LIF-7TB0075-B	632112.94	671248.88	-21.67	-24.17	PD-8
LIF-7TB0075-C	632093.58	671230.68	-26.51	-27.01	PD-8
LIF-7TB0110-A	632124.58	671199.72	-19.42	-21.47	PD-8
LIF-7TB0110-B	632139.57	671223.73	-23.00	-26.00	PD-8
LIF-7TB0110-C	632103.67	671204.69	-17.40	-19.20	PD-8
LIF-7TB0145-A	632144.17	671177.10	-15.15	-18.10	PD-8
LIF-7TB0145-B	632170.23	671200.50	-22.34	-27.64	PD-8
LIF-7TB0145-C	632190.27	671182.96	-23.98	-26.48	PD-8
LIF-7TB0170-A1	632180.15	671168.31	-20.20	-26.45	PD-8
LIF-7TB0200-A	632209.29	671154.44	-22.46	-24.46	PD-8

CP: JO Date: 3/20/2017 APC: RS Date: 3/21/2017 CC: RS Date: 3/21/2017

Client: RD Group Project: Gowanus Canal Superfund Site Project No: PHH106A

Sounding ID	X (ft NAD83)	Y (ft NAD83)	Elev Bottom Soft Sediment (ft- NAVD88)	Elev Bottom Native Sediment (ft-NAVD88)	Data Source
LIF-7TB0200-C	632230.04	671171.90	-21.56	-27.56	PD-8
LIF-7TB0300-A	632288.69	671101.12	-15.62	-24.12	PD-8
LIF-MC0000-A	634418.54	673625.99	-18.13	-22.13	PD-8
LIF-MC0000-A1	634411.53	673617.43	-17.86	-21.86	PD-8
LIF-MC0050-A	634396.37	673635.74	-14.27	-19.77	PD-8
LIF-MC0050-B	634441.17	673602.82	-15.69	-20.69	PD-8
LIF-MC0100-A	634398.12	673565.95	-18.20	-21.70	PD-8
LIF-MC0150-A	634351.93	673532.23	-20.75	-23.05	PD-8
LIF-MC0150-B	634394.77	673514.39	-17.21	-19.91	PD-8
LIF-MC0200-A	634359.95	673477.58	-15.80	-18.30	PD-8
LIF-MC0250-A	634295.19	673443.39	-17.08	-19.08	PD-8
LIF-MC0250-B	634350.07	673433.36	-18.21	-24.21	PD-8
LIF-MC0300-A	634302.85	673391.05	-15.76	-17.51	PD-8
LIF-MC0350-A1	634264.67	673363.12	-17.58	NA	PD-8
LIF-MC0350-B	634309.00	673340.09	-16.52	-17.92	PD-8
LIF-MC0400-A	634252.44	673300.56	-15.21	-18.21	PD-8
LIF-MC0450-A	634212.47	673270.50	-16.37	-17.37	PD-8
LIF-MC0450-A1	634220.93	673265.08	-17.82	-18.32	PD-8
LIF-MC0450-B	634254.85	673241.33	-15.34	-18.09	PD-8
LIF-MC0450-B1	634255.70	673245.57	-15.98	-18.98	PD-8
LIF-MC0500-A	634212.79	673213.42	-12.85	-14.25	PD-8
LIF-MC0500-A1	634210.65	673214.67	-12.53	-13.53	PD-8
LIF-MC0550-A	634164.03	673178.16	-13.09	-18.09	PD-8
LIF-MC0550-B	634218.13	673155.88	-11.65	-14.25	PD-8
LIF-MC0600-A	634161.27	673131.34	-13.58	-18.78	PD-8
LIF-MC0650-A	634119.77	673089.02	-17.43	NA	PD-8
LIF-MC0650-A1	634111.64	673083.36	-17.73	-19.23	PD-8
LIF-MC0650-A2	634118.67	673079.26	-19.12	-20.87	PD-8
LIF-MC0650-B	634155.82	673071.98	-17.36	-18.71	PD-8
LIF-MC0650-B1	634156.54	673078.07	-17.54	-19.24	PD-8
LIF-MC0700-A	634117.64	673038.19	-16.60	NA	PD-8
LIF-MC0700-A1	634116.51	673042.26	-18.16	NA	PD-8
LIF-MC0750-A	634075.26	673010.23	-15.29	-17.64	PD-8
LIF-MC0750-A1	634073.07	673004.27	-16.51	-18.91	PD-8
LIF-MC0750-B	634113.17	672983.28	-16.80	NA	PD-8
LIF-MC0750-B1	634108.13	672982.74	-17.23	NA	PD-8

CP: **JO** Date: **3/20/2017** APC: **RS** Date: **3/21/2017** CC: **RS** Date: **3/21/2017**

Client: **RD Group** Project: **Gowanus Canal Superfund Site** Project No: **PHH106A**

Sounding ID	X (ft NAD83)	Y (ft NAD83)	Elev Bottom Soft Sediment (ft- NAVD88)	Elev Bottom Native Sediment (ft- NAVD88)	Data Source
LIF-MC0800-A	634078.38	672946.38	-17.61	-24.11	PD-8
LIF-MC0850-A	634027.16	672920.46	-14.53	-26.33	PD-8
LIF-MC0850-B	634081.06	672895.53	-14.55	-21.30	PD-8
LIF-MC0850-B1	634083.25	672899.36	-14.30	-21.80	PD-8
LIF-MC0900-A	634056.80	672901.29	-16.17	-23.17	PD-8
LIF-MC0950-A	633975.76	672801.52	-12.79	-14.99	PD-8
LIF-MC0950-B	634013.37	672786.44	-14.89	-15.39	PD-8
LIF-MC1000-A	633984.71	672790.27	-16.25	PINCH	PD-8
LIF-MC1050-A	633939.09	672735.43	-14.56	-18.06	PD-8
LIF-MC1050-B	633959.45	672705.04	-15.30	PINCH	PD-8
LIF-MC1100-A	633943.49	672670.01	-15.64	-17.14	PD-8
LIF-MC1150-A	633894.04	672644.46	-14.53	-16.53	PD-8
LIF-MC1150-B	633913.10	672606.63	-14.18	-14.68	PD-8
LIF-MC1200-A	633893.11	672583.90	-14.83	-16.33	PD-8
LIF-MC1250-A	633846.25	672558.55	-13.77	-16.47	PD-8
LIF-MC1250-B	633889.47	672561.76	-13.63	PINCH	PD-8
LIF-MC1300-A	633854.32	672504.89	-13.45	-16.41	PD-8
LIF-MC1350-A	633808.56	672471.44	-17.74	-19.34	PD-8
LIF-MC1350-B	633847.72	672449.34	-14.62	-18.12	PD-8
LIF-MC1400-A	633818.08	672424.91	-16.25	-18.00	PD-8
LIF-MC1500-A	633773.22	672296.14	-16.97	-20.97	PD-8
LIF-MC1500-B	633826.07	672307.29	-15.67	-21.67	PD-8
LIF-MC1550-A	633797.73	672252.13	-17.07	-24.97	PD-8
LIF-MC1600-A1	633779.75	672203.35	-13.95	-16.95	PD-8
LIF-MC1600-B	633819.28	672207.26	-14.52	-18.52	PD-8
LIF-MC1650-A	633795.88	672162.65	-15.03	-19.03	PD-8
LIF-MC1700-A	633758.52	672104.66	-15.95	-21.35	PD-8
LIF-MC1700-B	633811.16	672103.15	-15.36	-22.36	PD-8
LIF-MC1750-A	633784.90	672063.65	-14.88	-20.63	PD-8
LIF-MC1800-A	633736.61	672034.39	-14.62	PINCH	PD-8
LIF-MC1800-B	633787.93	672004.77	-13.19	PINCH	PD-8
LIF-MC1850-A	633728.24	671972.27	-17.13	-19.43	PD-8
LIF-MC1900-A	633691.28	671946.06	-15.85	-22.35	PD-8
LIF-MC1900-B	633722.41	671904.89	-17.82	-22.82	PD-8
LIF-MC1950-A	633663.35	671888.47	-18.32	-22.02	PD-8
LIF-MC2000-A	633632.70	671858.17	-14.24	-18.54	PD-8

CP: JO Date: 3/20/2017 APC: RS Date: 3/21/2017 CC: RS Date: 3/21/2017

Client: RD Group Project: Gowanus Canal Superfund Site Project No: HPH106A

Sounding ID	X (ft NAD83)	Y (ft NAD83)	Elev Bottom Soft Sediment (ft- NAVD88)	Elev Bottom Native Sediment (ft- NAVD88)	Data Source
LIF-MC2000-B	633668.24	671833.06	-15.33	-19.23	PD-8
LIF-MC2050-A	633633.40	671817.54	-15.75	-22.00	PD-8
LIF-MC2100-A	633579.73	671777.40	-23.53	-24.53	PD-8
LIF-MC2100-B	633623.22	671746.67	-23.07	-25.07	PD-8
LIF-MC2150-A	633577.46	671722.76	-16.99	-26.59	PD-8
LIF-MC2200-A	633530.93	671705.59	-16.25	-24.55	PD-8
LIF-MC2200-B	633569.03	671676.01	-17.09	-24.79	PD-8
LIF-MC2250-A	633550.88	671678.89	-19.56	-24.11	PD-8
LIF-MC3400-A	632473.53	671605.68	-17.10	-21.40	PD-8
LIF-MC3400-B	632461.03	671564.02	-19.91	-24.81	PD-8
LIF-MC3450-A	632432.90	671580.80	-21.81	-25.11	PD-8
LIF-MC3500-A	632388.71	671582.11	-18.24	-23.22	PD-8
LIF-MC3500-B	632412.67	671536.96	-22.66	-24.51	PD-8
LIF-MC3550-A	632370.55	671540.17	-21.00	-25.50	PD-8
LIF-MC3600-A	632340.95	671576.68	-20.52	-22.72	PD-8
LIF-MC3600-B	632342.55	671497.13	-20.55	-24.75	PD-8
LIF-MC3700-A	632174.56	671479.94	-22.01	-25.31	PD-8
LIF-MC3700-B	632193.54	671426.07	-22.59	-26.54	PD-8
LIF-MC3750-A1	632173.76	671422.63	NA	-23.94	PD-8
LIF-MC3750-B1	632138.07	671450.08	-19.25	-23.35	PD-8
LIF-MC3800-A	632114.23	671418.21	-21.49	-25.44	PD-8
LIF-MC3800-B	632159.66	671375.97	-18.37	-23.47	PD-8
LIF-MC3850-A	632105.32	671365.59	-23.84	-25.54	PD-8
LIF-MC3850-B	632082.20	671384.00	-23.11	-25.51	PD-8
LIF-MC3900-A	632047.97	671344.71	-23.22	-24.97	PD-8
LIF-MC3900-B	632100.96	671314.45	NA	-23.80	PD-8
LIF-MC3950-A	632046.84	671287.64	-21.37	-25.62	PD-8
LIF-MC3950-B	632027.68	671301.79	-19.99	-24.33	PD-8
LIF-MC4000-A	631999.42	671270.91	-24.01	-26.91	PD-8
LIF-MC4000-B	632037.94	671217.54	-23.28	-26.63	PD-8
LIF-MC4000-C	632062.31	671244.36	-23.00	-25.30	PD-8
LIF-MC4025-A	631999.15	671241.01	-18.43	-25.03	PD-8
SED-4TB0000-A	633404.24	671455.38	-17.71	-20.91	PD-8
SED-4TB0450-A	633583.79	671097.58	-12.00	NA	PD-8
SED-4TB0550-A1	633697.23	671027.83	-16.34	NA	PD-8
SED-4TB0550-A2	633683.99	671033.59	SHORT	-24.01	PD-8

CP: **JO** Date: **3/20/2017** APC: **RS** Date: **3/21/2017** CC: **RS** Date: **3/21/2017**

Client: **RD Group** Project: **Gowanus Canal Superfund Site** Project No: **PHH106A**

Sounding ID	X (ft NAD83)	Y (ft NAD83)	Elev Bottom Soft Sediment (ft- NAVD88)	Elev Bottom Native Sediment (ft- NAVD88)	Data Source
SED-4TB0550-B	633706.61	671080.41	-14.60	-23.20	PD-8
SED-4TB0650-A	633790.96	670962.21	-12.84	-16.24	PD-8
SED-4TB0700-A	633840.28	670953.50	-18.61	-19.71	PD-8
SED-MC0150-B	634375.04	673535.54	-16.38	NA	PD-8
SED-MC0150-B2	634375.21	673529.43	-18.86	-19.36	PD-8
SED-MC0450-B	634241.36	673240.24	-13.94	-17.44	PD-8
SED-MC0450-B2	634241.79	673243.57	SHORT	-18.07	PD-8
SED-MC0850-A	634029.28	672910.27	-15.50	NA	PD-8
SED-MC0850-A1	634033.80	672904.21	-15.26	-25.36	PD-8
SED-MC1100-A	633935.32	672651.21	-17.33	-17.93	PD-8
SED-MC1500-A	633776.18	672296.11	-16.35	-17.45	PD-8
SED-MC2000-A	633635.15	671857.69	-18.54	NA	PD-8
SED-MC2000-A1	633635.02	671855.03	SHORT	-19.66	PD-8
SED-MC2100-B	633624.37	671746.11	-22.20	-23.50	PD-8
SEDMO-4TB0000-A	633400.73	671451.82	NA	NA	PD-8
SEDMO-4TB0450-A	633587.27	671105.21	SHORT	-24.37	PD-8
SEDMO-4TB0550-B	633699.57	671074.77	SHORT	-23.43	PD-8
SEDMO-4TB0650-A1	633791.41	670965.83	SHORT	NA	PD-8
SEDMO-MC0150-B	634376.99	673524.31	SHORT	-21.89	PD-8
SEDMO-MC0450-B3	634252.23	673247.79	SHORT	-18.78	PD-8
SEDMO-MC0850-A	634031.12	672901.92	-18.18	-23.93	PD-8
SEDMO-MC1100-A1	633931.90	672663.78	SHORT	-23.96	PD-8
SEDMO-MC1500-A	633779.02	672294.85	NA	NA	PD-8
SEDMO-MC2100-B	633625.80	671747.23	SHORT	-24.83	PD-8
SEDMO-MC3400-B	632450.44	671578.73	SHORT	NA	PD-8
SEDMO-MC3550-A	632358.67	671550.18	NA	-25.13	PD-8
SEDMO-MC3750-B1	632154.23	671456.40	-22.27	-24.47	PD-8
SEDMO-MC3850-A	632103.57	671368.54	SHORT	-24.76	PD-8
SEDMO-MC4000-C1	632062.42	671243.12	-23.86	-25.51	PD-8
SED-4TB0150-A	633447.10	671297.63	-16.25	-26.85	PD-7/18
SED-4TB0400-A	633562.30	671132.95	-14.19	-27.09	PD-7/18
SED-4TB0600-A	633754.90	671028.40	-15.09	-22.29	PD-7/18

CP: **JO** Date: **3/20/2017** APC: **RS** Date: **3/21/2017** CC: **RS** Date: **3/21/2017**

Client: **RD Group** Project: **Gowanus Canal Superfund Site** Project No: **HPH106A**

Sounding ID	X (ft NAD83)	Y (ft NAD83)	Elev Bottom Soft Sediment (ft- NAVD88)	Elev Bottom Native Sediment (ft- NAVD88)	Data Source
SED-MC0000-A	634424.00	673643.04	-14.76	NA	PD-7/18
SED-MC0250-A	634331.30	673454.33	-14.97	-19.67	PD-7/18
SED-MC0600-A	634166.80	673138.10	-15.13	-16.83	PD-7/18
SED-MC0700-A	634100.10	673013.70	-15.90	-18.80	PD-7/18
SED-MC0700-B	634092.70	673025.00	-15.70	-18.60	PD-7/18
SED-MC1000-A	633981.70	672767.87	-14.11	PINCH	PD-7/18
SED-MC1250-A	633867.00	672540.35	-13.88	PINCH	PD-7/18
SED-MC1550-A	633791.50	672261.06	-17.08	-25.74	PD-7/18
SED-MC1800-A	633751.50	672020.67	-13.70	PINCH	PD-7/18
SED-MC2100-A	633597.90	671752.37	-17.01	-25.11	PD-7/18
SED-MC2400-A	633432.50	671487.83	-14.74	-22.04	PD-7/18
SED-MC2800-A	633104.80	671512.40	-16.08	-19.08	PD-7/18
SED-MC3050-A	632854.30	671560.25	-21.18	-23.48	PD-7/18
SED-MC3250-A	632640.50	671573.27	-17.22	-23.32	PD-7/18
SED-MC3550-A	632352.50	671534.74	-14.39	-19.99	PD-7/18
SED-6TB0200-A	632480.00	671434.63	-16.46	-18.96	PD-7/18
SED-MC3850-A	632103.50	671371.62	-20.18	-24.68	PD-7/18
SED-7TB0300-A	632313.50	671097.53	-15.34	-25.34	PD-7/18
SED-MC4050-A	632004.20	671223.25	-16.85	-26.85	PD-7/18
SED-MC4250-A	631880.00	671022.35	-18.84	PINCH	PD-7/18
SED-MC4650-B	631683.90	670707.56	-18.91	-25.81	PD-7/18
SED-MC4850-A	631580.80	670536.88	-21.37	-28.87	PD-7/18
SED-MC5050-A	631486.30	670366.55	-16.99	-26.39	PD-7/18
SED-MC5650-A	631142.00	669795.60	-25.96	-30.16	PD-7/18
SED-MC6000-A	630997.50	669517.94	-31.77	PINCH	PD-7/18
SED-MC6300-B	630895.50	669117.16	-41.03	PINCH	PD-7/18
SED-MC6950-A	630608.40	668776.00	-38.97	PINCH	PD-7/18
SED-MC7800-A	629782.10	668318.48	-30.89	NA	PD-7/18
FW-SB-201	634411.56	673530.20	-19.20	NA	GZA
FW-SB-202	634313.34	673344.28	-18.00	NA	GZA
FW-SB-203	634231.66	673212.41	-14.00	NA	GZA
GC-SD139_EPA	630435.96	668733.58	-34.50	NA	EPA
GC-SD140_EPA	630526.94	668625.44	-43.30	NA	EPA
GC-SD141_EPA	630591.52	668510.65	-38.50	NA	EPA
GC-SD142_EPA	630022.58	668390.50	-39.30	NA	EPA
GC-SD143_EPA	630211.16	668362.60	-43.20	NA	EPA

CP: **JO** Date: **3/20/2017** APC: **RS** Date: **3/21/2017** CC: **RS** Date: **3/21/2017**

Client: **RD Group** Project: **Gowanus Canal Superfund Site** Project No: **HPH106A**

Sounding ID	X (ft NAD83)	Y (ft NAD83)	Elev Bottom Soft Sediment (ft- NAVD88)	Elev Bottom Native Sediment (ft- NAVD88)	Data Source
GC-SD144b_EPA	630407.60	668352.52	-46.60	NA	EPA
GC-SD144c_EPA	630404.83	668362.00	-42.00	NA	EPA
GC-SD81A_EPA*	630209.73	668620.52	-44.77	NA	EPA
GC-SD83A_EPA*	630139.54	668432.01	-45.08	NA	EPA
GC-SED-80	630235.87	668693.05	-43.80	NA	GEI
GC-SED-82	630179.20	668543.52	-44.90	NA	GEI
GC-SED-79	630253.55	668736.88	-36.20	NA	GEI
GCSD-7TB0200-A	632214.32	671155.97	-28.53	NA	CH2M
GCSD-7TB0110-C	632110.62	671202.00	NA	-15.82	CH2M
GCSD-7TB0145-A	632132.32	671194.47	NA	-17.76	CH2M

Notes:

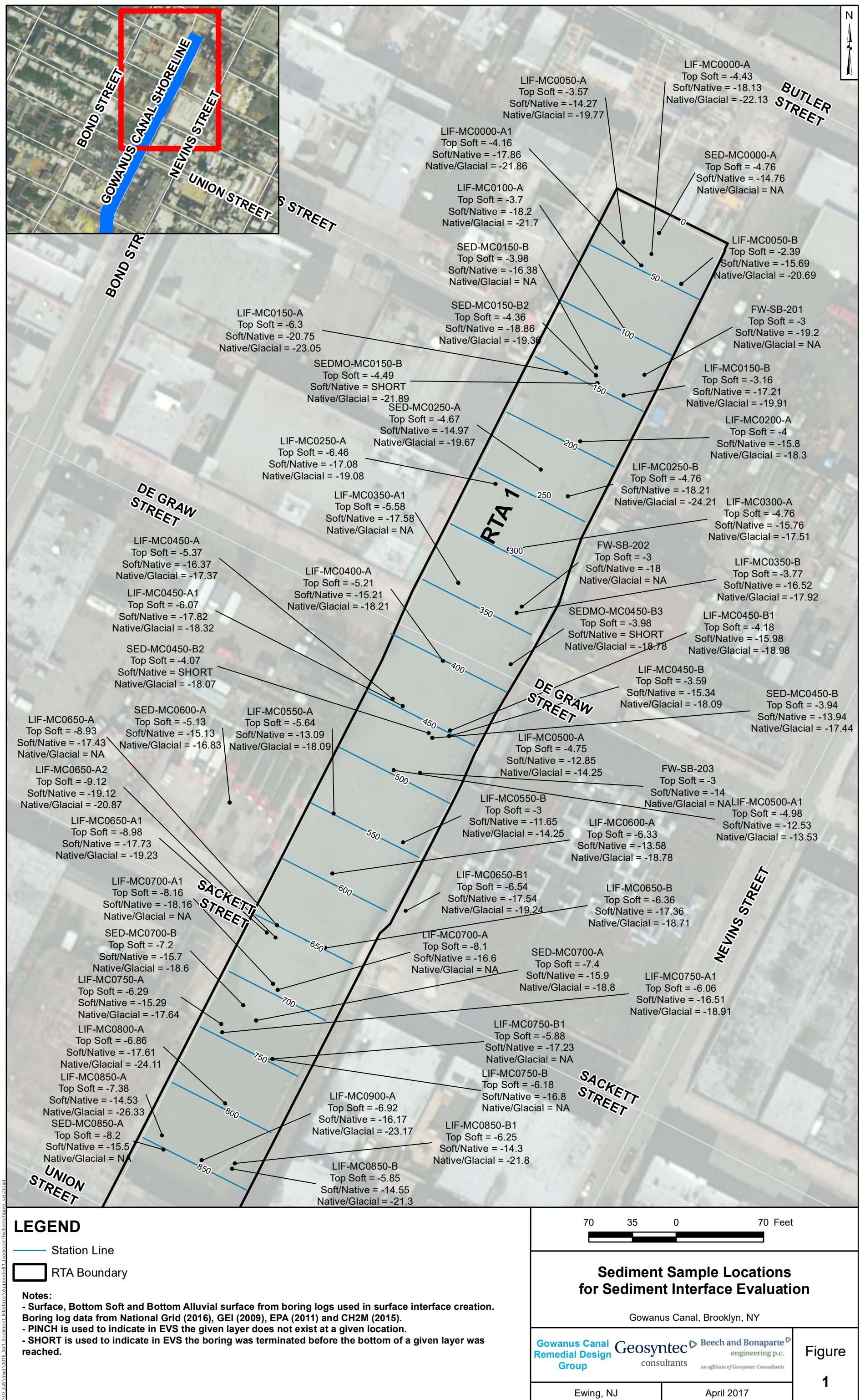
- PINCH is used to indicate in EVS the given layer does not exist at a given location.
- SHORT is used to indicate in EVS the boring was terminated before the bottom of a given layer was reached.

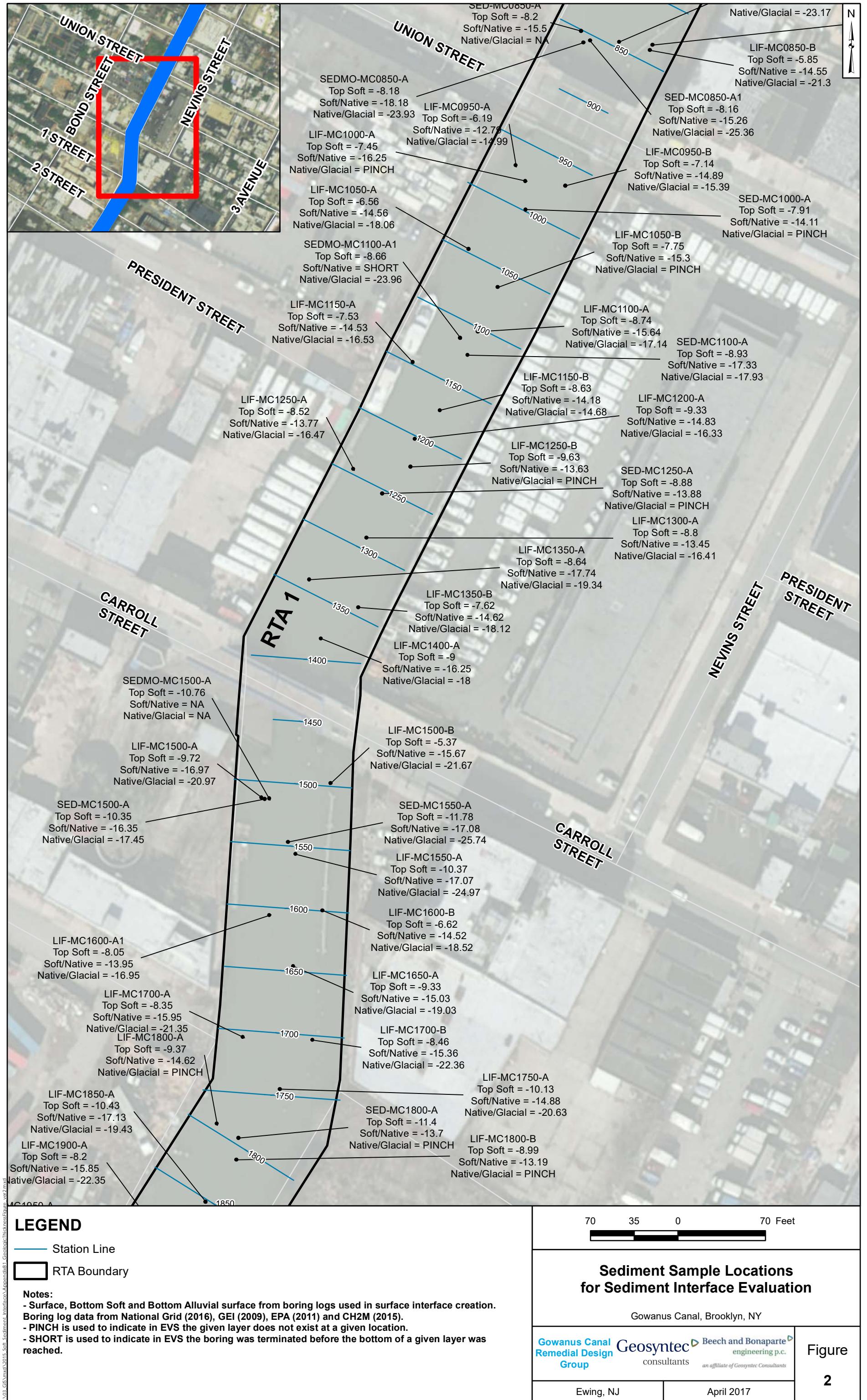
Page **13** of **23**

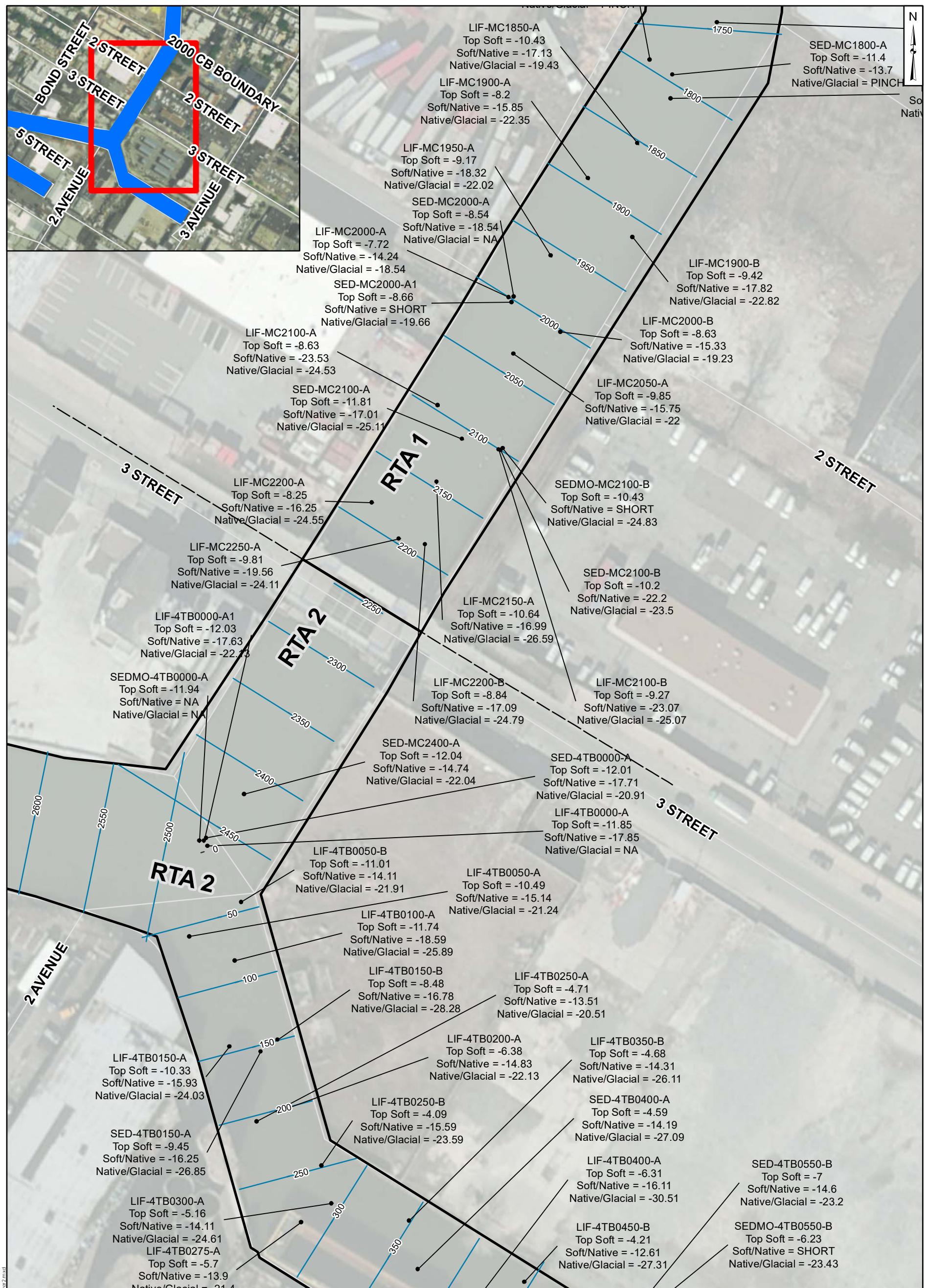
CP: **JO** Date: **3/20/2017** APC: **RS** Date: **3/21/2017** CC: **RS** Date: **3/21/2017**

Client: **RD Group** Project: **Gowanus Canal Superfund Site** Project No: **HPH106A**

FIGURES







LEGEND

— Station Line

□ RTA Boundary

Notes:

- Surface, Bottom Soft and Bottom Alluvial surface from boring logs used in surface interface creation.
- Boring log data from National Grid (2016), GEI (2009), EPA (2011) and CH2M (2015).
- PINCH is used to indicate in EVS the given layer does not exist at a given location.
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70 35 0 70 Feet

Sediment Sample Locations for Sediment Interface Evaluation

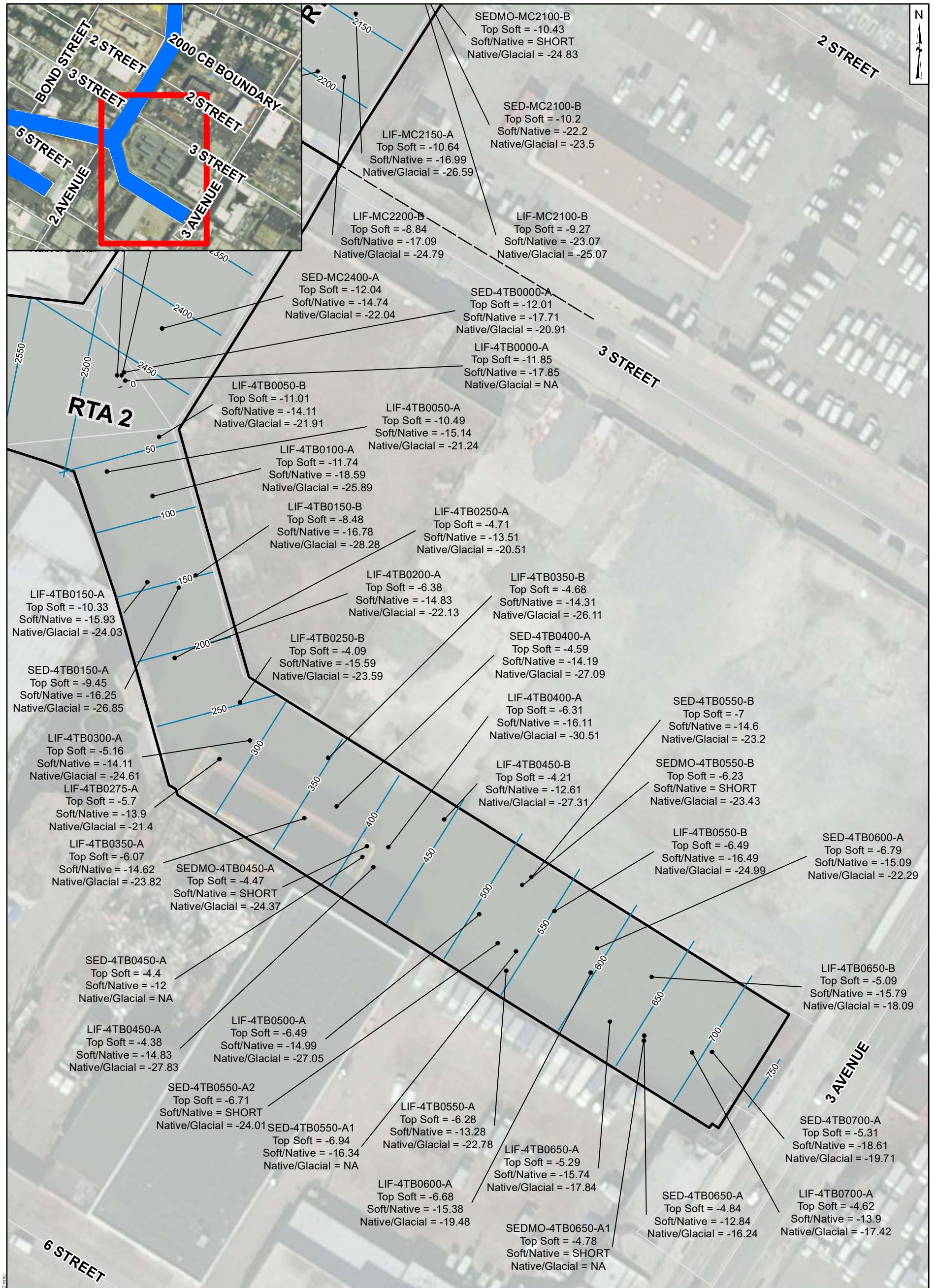
Gowanus Canal, Brooklyn, NY

Gowanus Canal Remedial Design Group Geosyntec Beech and Bonaparte engineering p.c.
an affiliate of Geosyntec Consultants

Figure
3

Ewing, NJ

April 2017



LEGEND

- Station Line
- RTA Boundary

Notes:

- Surface, Bottom Soft and Bottom Alluvial surface from boring logs used in surface interface creation.
- Boring log data from National Grid (2016), GEI (2009), EPA (2011) and CH2M (2015).
- PINCH is used to indicate in EVS the given layer does not exist at a given location.
- SHORT is used to indicate in EVS the boring was terminated before the bottom of a given layer was reached.

70 35 0 70 Feet

Sediment Sample Locations
for Sediment Interface Evaluation

Gowanus Canal, Brooklyn, NY

Gowanus Canal Remedial Design Group Geosyntec Beech and Bonaparte engineering p.c.
consultants an affiliate of Geosyntec Consultants

Figure
4



LEGEND

- Station Line
 - RTA Boundary

Notes:

- Notes:**

 - Surface, Bottom Soft and Bottom Alluvial surface from boring logs used in surface interface creation.
 - Boring log data from National Grid (2016), GEI (2009), EPA (2011) and CH2M (2015).
 - PINCH is used to indicate in EVS the given layer does not exist at a given location.
 - SHORT is used to indicate in EVS the boring was terminated before the bottom of a given layer was reached.

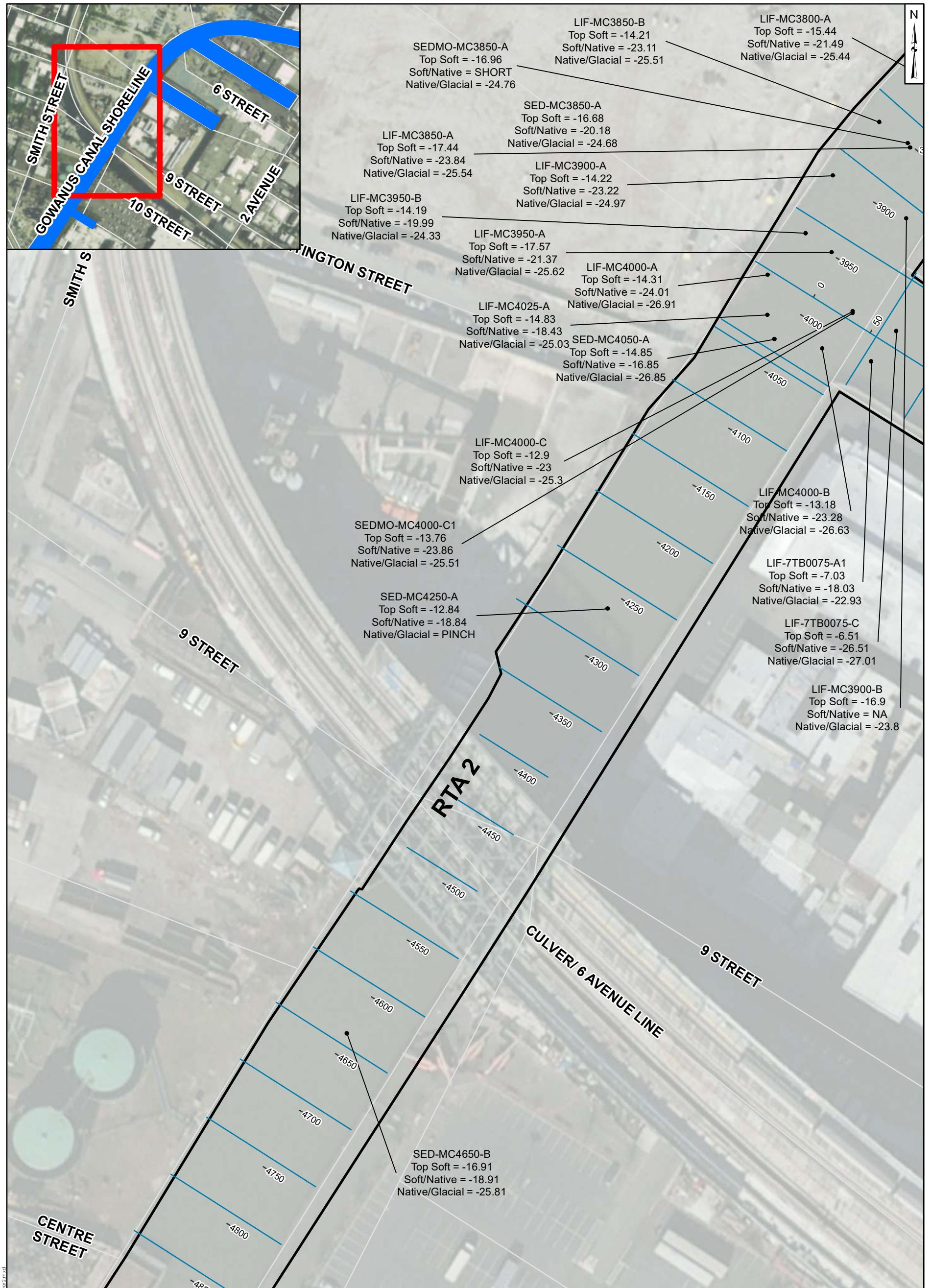


Sediment Sample Locations for Sediment Interface Evaluation

Gowanus Canal, Brooklyn, NY

Gowanus Canal Remedial Design Group Geosyntec consultants ▷ Beech and Bonaparte engineering p.c.
an affiliate of Geosyntec Consultants

Figure 5



LEGEND

- Station Line
- RTA Boundary

Notes:

- Surface, Bottom Soft and Bottom Alluvial surface from boring logs used in surface interface creation.
- Boring log data from National Grid (2016), GEI (2009), EPA (2011) and CH2M (2015).
- PINCH is used to indicate in EVS the given layer does not exist at a given location.
- SHORT is used to indicate in EVS the boring was terminated before the bottom of a given layer was reached.

70 35 0 70 Feet

Sediment Sample Locations for Sediment Interface Evaluation

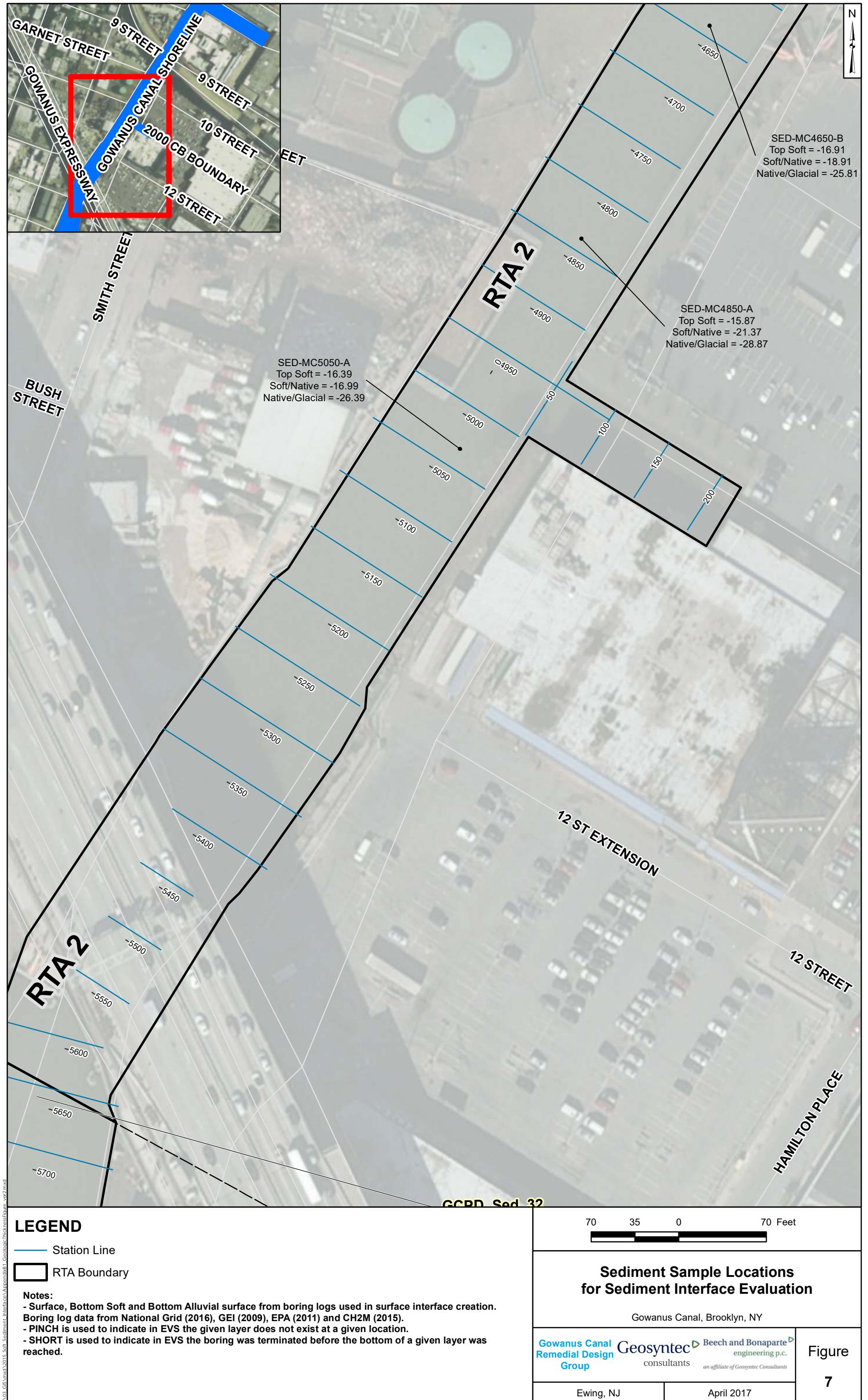
Gowanus Canal, Brooklyn, NY

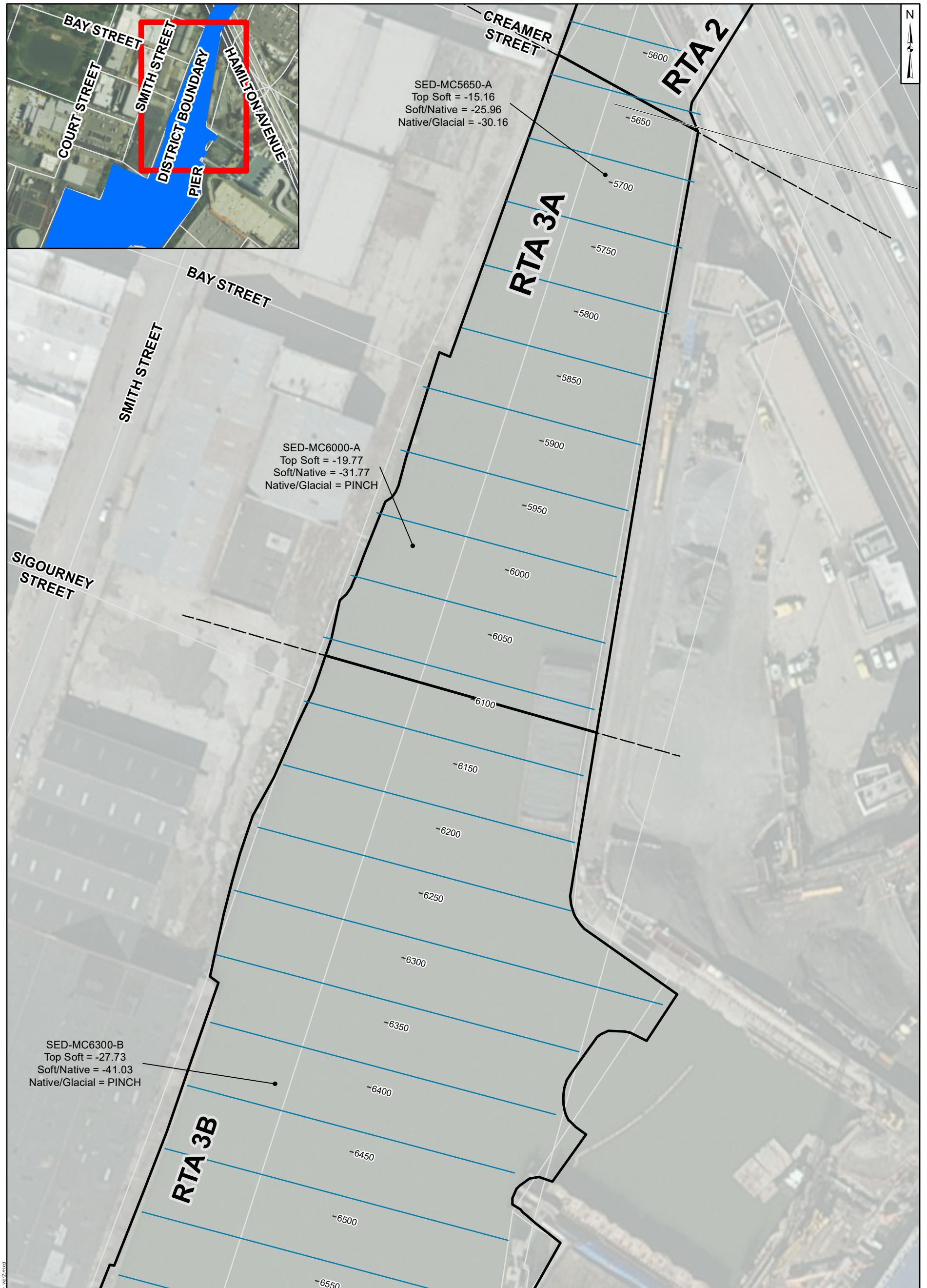
Gowanus Canal Remedial Design Group Geosyntec consultants Beech and Bonaparte engineering p.c.
an affiliate of Geosyntec Consultants

Figure
6

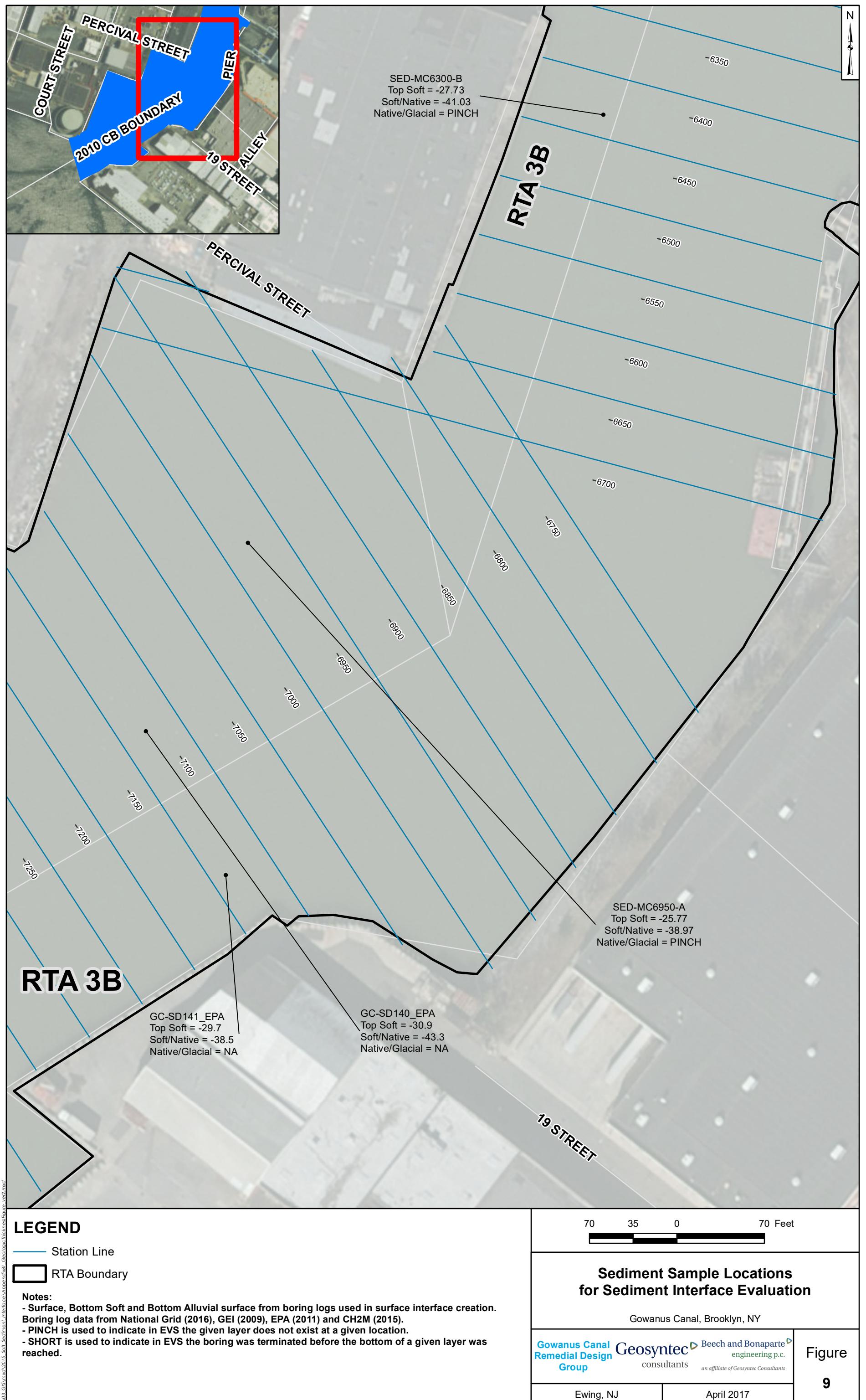
Ewing, NJ

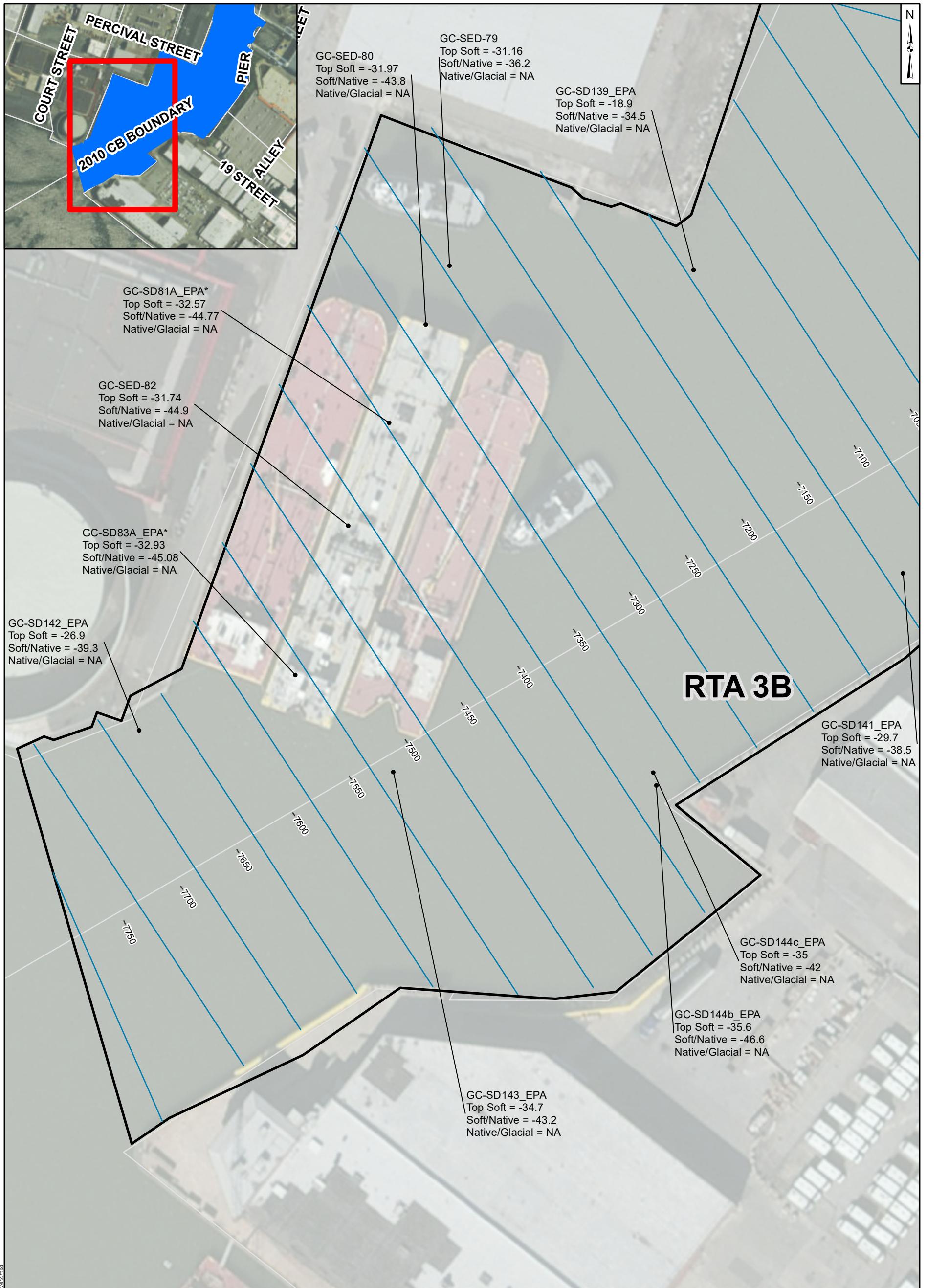
April 2017





LEGEND		70 35 0 70 Feet
<ul style="list-style-type: none"> — Station Line ■ RTA Boundary 		
Notes: <ul style="list-style-type: none"> - Surface, Bottom Soft and Bottom Alluvial surface from boring logs used in surface interface creation. Boring log data from National Grid (2016), GEI (2009), EPA (2011) and CH2M (2015). - PINCH is used to indicate in EVS the given layer does not exist at a given location. - SHORT is used to indicate in EVS the boring was terminated before the bottom of a given layer was reached. 		
Sediment Sample Locations for Sediment Interface Evaluation		
Gowanus Canal, Brooklyn, NY		
Gowanus Canal Remedial Design Group		Geosyntec ▶ Beech and Bonaparte engineering p.c. <small>an affiliate of Geosyntec Consultants</small>
Ewing, NJ		April 2017
Figure 8		





70 35 0 70 Feet

Sediment Sample Locations for Sediment Interface Evaluation

Gowanus Canal, Brooklyn, NY

Gowanus Canal Remedial Design Group **Geosyntec** Beech and Bonaparte engineering p.c.
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Figure
10

Ewing, NJ

April 2017